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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/435,766	11/08/1999	TOMOYOSHI KUSHIDA	104361	5662

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EXAMINER

LOKE, STEVEN HO YIN

ART UNIT	PAPER NUMBER
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2811

DATE MAILED: 06/03/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/435,766

Applicant(s)

KUSHIDA, TOMOYOSHI

Examiner

Steven Loke

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 March 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,4,12 and 20-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1,4,20 and 21 is/are allowed.
- 6) ☒ Claim(s) 12 and 22-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

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1. Claims 12 and 22-30 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Fig. 10B discloses a p⁻ type channel [215] formed between the gate electrode [218] and between the n-type drift region [214] and the source region [220]. The specification never discloses an impurity concentration of the channel region is equal to an impurity concentration in the drift region, and a depletion layer forms over the entire channel region sandwiched between the gate region when a zero bias is applied to the gate region as claimed in claim 12.

The specification never discloses the embodiment of fig. 10B includes a gate region of the first conductive type as claimed in claim 22.

The specification never discloses the embodiment of fig. 10B includes at least a part of the source electrode forms a Schottky junction with the channel region as claimed in claims 24 and 25.

The specification never discloses the embodiment of fig. 5 includes a semiconductor layer having the second conductive type located between the source region and the source electrode, and the semiconductor layer including an end face extended to a position covering at least a portion of the gate region as claimed in claim 26.

The specification (fig. 14B, page 11, lines 3-5) discloses it is also possible to provide an n⁻-type (first conductive type) first anode region [537] having a concentration equal

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to or less than the n^- -type cathode region [534] instead of the p^- -type (second conductive type) first anode region [537]. The specification never discloses an impurity concentration of the first anode region of the second conductive type is equal to or less than an impurity concentration in the second cathode region as claimed in claim 30

2. Claims 28 and 29 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 28, lines 4-5, the phrase "a distance of the gate region surrounding at least the channel region" is unclear whether it is being referred to a distance between the vertical sidewalls of the first and second portions of the gate region.

Claim 29, lines 4-5, the phrase "a space of the gate region surrounding at least the channel region" is unclear whether it is being referred to a distance between the vertical sidewalls of the first and second portions of the gate region.

3. Claims 24, 25 and 30 are objected to because of the following informalities: Claim 24, line 2, the phrase "the source electrode" has no antecedent basis. Claim 25, line 2, the phrase "the source electrode" has no antecedent basis. Claim 30, line 11, the phrase "the second cathode" has no antecedent basis. Appropriate correction is required.

4. Applicant's arguments filed 3/10/03 have been fully considered but they are not persuasive.

It is urged, in pages 3-4 of the remarks, that the specification does disclose that an impurity concentration contained in the channel is set equal to or less than the impurity

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concentration in the n drift region 114 ((page 8, lines 18-19) (an embodiment of fig. 9B) and the specification at page 9, lines 25-29 (an embodiment of fig. 11B)). However, claim 12 is directed to an embodiment of fig. 10B. The specification never discloses the embodiment of fig. 10B discloses an impurity concentration contained in the channel is set equal to or less than the impurity concentration in the n drift region. The claimed feature "the impurity concentration contained in the channel (215) is set equal to or less than the impurity concentration in the n drift region (214)" is not inherent in the specification.

It is urged, in page 4 of the remarks, that the Schottky junction with the channel region is disclosed at least at page 7, lines 12-14 with Fig. 7. However, claim 12 is directed to an embodiment of fig. 10B. The specification never discloses the embodiment of fig. 10B discloses a Schottky junction with the channel region. It is also urged that the second embodiment (fig. 9B) differs from the above mentioned first embodiment (fig. 1B) in the substrate and conductive type at page 8, lines 15-16. However, both the substrate and the channel region of the first and second embodiments (fig. 1B, fig. 9B) are different from each other. Fig. 9B never discloses at least a part of the source electrode forms a Schottky junction with the channel region. Therefore, the phrase "at least a part of the source electrode forms a Schottky junction with the channel region (215)" is not inherent in the specification. It is also urged that the specification at page 9, lines 31-32 (fig. 11B) discloses the fourth embodiment is a Schottky diode, and that it is also possible to use the P-type channel region. However, the embodiment of fig. 11B is directed to a Schottky diode that does not have a source

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region. The embodiment of fig. 11B cannot apply to claims 24 and 25 which are directed to the embodiment of fig. 10B.

It is urged, in page 4 of the remarks, that an n+ type extension region 100 and an insulating layer 24 may be provided on the n+ type region 20 for contact with the source electrode 22 at page 7, lines 21-22. However, claim 1 is directed to an embodiment of fig. 5. The specification never discloses the embodiment of fig. 5 discloses an n+ type extension region and an insulating layer provided on the n+ type region for contact with the source electrode as claimed in claim 26.

5. Claims 1, 4, 20 and 21 are allowed.

6. The following is a statement of reasons for the indication of allowable subject matter: The major difference in the claims not found in the prior art of record is the source region is isolated from the insulation film. It helps to improve the switching speed from ON operation to OFF operation of the device.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven Loke whose telephone number is (703) 308-4920. The examiner can normally be reached on 7:50 am to 5:20 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (703) 308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

sl
June 1, 2003

Steven Loke
Primary Examiner
